Biobased production of alkanes and alkenes through metabolic engineering of microorganisms

Advancement in metabolic engineering of microorganisms has enabled bio-based production of a range of chemicals, and such engineered microorganism can be used for sustainable production leading to reduced carbon dioxide emission there. One area that has attained much interest is microbial hydrocarbon biosynthesis, and in particular, alkanes and alkenes are important high-value chemicals as they can be utilized for a broad range of industrial purposes as well as ‘drop-in’ biofuels. Some microorganisms have the ability to biosynthesize alkanes and alkenes naturally, but their production level is extremely low. Therefore, there have been various attempts to recruit other microbial cell factories for production of alkanes and alkenes by applying metabolic engineering strategies. Here we review different pathways and involved enzymes for alkane and alkene production and discuss bottlenecks and possible solutions to accomplish industrial level production of these chemicals by microbial fermentation.